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Development of Chemoentrepreneurship-Oriented Chemistry Module to Increase Students Entrepreneurial Interest of Class XI Even Semester Health Vocational High School

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Abstract:- This study aims to produce chemoentrepreneurship-oriented chemistry modules (CEP), then test the validity and practicality of the module while expressing the entrepreneurial interest of students. The type of research used is Research and Development (R&D) with a 4-D model (define, design, develop, and disseminate). The research subjects were students of class XI SMK Namira Husada Madina. The instrument used in this study was a questionnaire consisting of a questionnaire of validity and practicality that was analyzed using the Kappa Cohen formula. The results of the validity test analysis obtained kappa moment of 0.80 with a high validity category. The results of the practicality test analysis based on questionnaire responses of teachers and students obtained kappa moments respectively 0.85 ; and 0.87 with a very high category. Percentage of student's entrepreneurial interest before carrying out learning using the CEP module was 68.9% and after learning with the CEP module the percentage of student's entrepreneurial interest is 84.6%. Based on data analysis, the chemoentrepreneurship-oriented module developed has been valid and practically used for student learning resources as well as being able to increase the entrepreneurial interest of students in class XI Health Vocational High School.

Keywords:- *Modules, Entrepreneurship, Chemoentrepreneurship (CEP), Research and Development (R&D), 4-D Model.*

I. INTRODUCTION

The era of globalization is a challenge for the Indonesian people, especially the world of education. The world of education is required to prepare competent human resources to be able to compete in the global job market. Many intelligent people in Indonesia, even every year many graduates of S1 to S3 from dozens of universities spread across the archipelago graduated. This proves that Indonesia does not lack competent human resources (HR). But the reality is that Indonesia's natural resources are still managed by many foreign nations. This happens because the intellectual abilities of the Indonesian people are not matched by the ability of practice so that in terms of good concepts but in terms of practice not yet[1] .

Many education renewal efforts have been made to improve the quality of education in the era of globalization, one of which is by applying the 2013 curriculum. The 2013 curriculum requires students to be able to process, reason, and present material into the realm of concrete. One of the teacher's efforts to prepare students to become qualified individuals, is not only able to find work but also able to create jobs for themselves with entrepreneurial skills.

Inpres No. 4 of 1995 states that the ability of entrepreneurship needs to be cultivated to the community, especially in the younger generation[2]. Entrepreneurial interest in the younger generation can be increased through education in schools. Therefore, the learning process requires an approach that integrates entrepreneurship education into subjects, such as Chemistry. Chemistry is an experimental science, so that chemical material cannot be learned only by mastering a collection of knowledge in the form of facts, concepts, and principles, but also about mastering a process.

Learning chemistry that contains entrepreneurial values is the chemoentrepreneurship approach (CEP). The Chemoentrepreneurship Approach (CEP) is a contextual approach that aims to motivate students to have an entrepreneurial spirit. With this approach learning chemistry will be more fun and give students the opportunity to optimize their potential to produce products. If students are used to such learning conditions, it is possible to motivate students to become entrepreneurs[3].

The research results of Agus Prayitno, et al (2016) about the development of chemistry modules with SETS-oriented chemoentrepreneurship (CEP) orientation were able to increase motivation to learn by 20%, entrepreneurial interest by 20%, learning outcomes 79% from initial conditions were very feasible to be used in chemistry learning[4]. The same thing in the development of CEP-oriented buffer solution class XI senior hight school conducted by Rahmawanna (2016) shows that the chemo-Entrepreneurship (CEP) approach is effective to foster entrepreneurial interest and increase understanding of students' concepts[5]. Based on the explanation above, the authors conducted a study entitled "Development of Chemo-entrepreneurship- Oriented Chemistry Module to Increase Students Entrepreneurial Interest of Class XI Even Semester Health Vocational High School".

II. RESEARCH METHOD

The type of research used ini this study is research and development (R&D). The study was conducted at the Health Vocational High School Namira Husada Madina with the test subjects of class XI students totaling 26 students. The type of data used is primary data obtained direc Research subjects were conducted in class XI totaling 26 students. The type of data used is primary data obtained directly from lecturers, teachers, and students. The instruments used were: 1) questionnaire validity, 2) practicality questionnaire, and 3) student entrepreneurial interest questionnaire.

This study uses a 4-D (Four D) model . Four D model consists of 4 stages of development: (1) define, (2) design, (3) develop, and (4) disseminate . The define phase aims to establish and define learning requirements. This stage consists of 5 main steps, namely (1) front-end, (2) student analysis, (3) task analysis, (4) concept analysis, (5) analysis of learning objectives[6].

The design phase aims to prepare a prototype of a learning device. This stage consists of choosing teaching materials, choosing formats, and initial designs. At this stage the authors designed a chemoentrepreneurship-oriented module before being tested. Next is the develop phase which consists of the validity, revision, and practicality stages. Validity test is carried out by giving a validity questionnaire consisting of 4 aspects of assessment, namely in terms of content eligibility, language, presentation, and graphics to 6 validators (4 chemistry lecturers and 2 chemistry teachers). The practicality test was conducted by the teacher (3 chemistry teachers) and 26 students in class XI of Health Vocational High School Namira Husada Madina.

The validator's assessment of each statement in the validity and practicality sheet is analyzed using kappa moment (k).

$$kappa\ moment\ \ (k) = \frac{P - Pe}{1 - Pe}$$

The interpretation of kappa moment values in the validity category is as shown in Table 1[7] .

Interval	Category
0.81 - 1.00	Very high
0.61 - 0.80	High
0.41 - 0.60	Medium
0.21 - 0.40	Low
0.01 - 0.20	Very low
≤ 0.00	Invalid

Table 1:- Decision Categories Based on Kappa Moments (k)

III. RESULTS

A. Development Results

This research produced chemoentrepreneurship-oriented modules on class XI chemistry material (even semester), and obtained the level of validity and practicality of the modules as well as the students' entrepreneurial interest. This study was designed on the basis of a 4-D learning device development model.

➢ *Stage define*

This stage consists of five steps, namely front end analysis, student analysis, task analysis, concept analysis and learning goal analysis, with the following description.

- *Front-end analysis*

Based on interviews with chemistry teachers at Health Vocational High School Namira Husada Madina, and SMKN Panyabungan, The author obtained information that learning chemistry at the school uses teaching materials in the form of textbooks and student worksheets that do not have practical activities. The book has not been able to increase the interest of students in entrepreneurship. The book used also cannot equip students with certain skills so they are ready to face the world of work.

According to teachers at the school that students have an interest in entrepreneurship, but the books they have do not support to improve the skills and abilities of students in making a product of economic value. Based on this analysis, it takes a teaching material that can support the sustainability of chemistry learning, can improve understanding of concepts, and students are able to have the skills so that they dare to compete in the face of competition in the world of work. One way is to integrate entrepreneurship into learning through teaching materials in the form of chemoentrepreneurship-oriented modules for students at the Vocational High School level.

- *Analyze students*

In the analysis phase of students obtained information about the characteristics of students which include academic ability, motivation to learn, and age. The academic ability of students in chemical materials is heterogeneous, meaning that students have high, medium, and low academic abilities.

Students in class XI are around 15-17 years old who are still classified as teenagers. The ability to think of children at this age has arrived at abstract, logical, and able to draw conclusions[8]. Cognitive development at this age increases the ability to obtain new information. Although students already have the ability to think abstractly, they still need to learn from the results of real world exploration. Modules designed by the author are contextual that are directly related to the daily lives of students and are equipped with practical steps that produce a product that has a sale value.

By knowing the characteristics possessed by students, the writer is easier to design teaching materials that are suitable for use in learning. Designed teaching materials are oriented module chemoentrepreneurship for class XI Vocational High School are expected to increase academic skills, motivation, and according to the age of learners levels of Vocational High School.

- *Analysis Tasks*

At this stage the authors conducted a KD analysis contained in the 2013 curriculum syllabus, then translated into several learning indicators.

- *Concept Analysis*

At this stage the authors identify the main concepts in the chemistry of even semester XI classes.

- *Analysis of Learning Objectives*

Analysis of learning objectives is the stage of changing the results of task analysis and concept analysis into learning objectives. This analysis is used as a basis for constructing teaching materials that have been made.

➢ *Design Stage*

At this stage a chemoentrepreneurship -oriented chemistry module has been designed for class XI Health Vocational High School. This module is based on module components according to the Ministry of Depdiknas (2008) which has been modified. The components of the modules compiled are as follows.

- *Cover module*

In this section there is the module title, author's name , author's institution, and the name of the supervisor.

- *Module usage instructions*

This section contains procedures for using the module which will be a guide for teachers and students in using the module.

- *Competencies to be achieved*

In this section there are core competencies, basic competencies, indicators, and learning objectives aimed at making module users know and understand the competencies that must be achieved.

- *Introduction*

In the introduction section contains apperception that aims to prepare and motivate students to follow the learning process.

- *Concept map*

In this section there is a general description of the material to be studied by students.

- *Activity sheet*

On this sheet there are 3 sections designed to foster entrepreneurial interest in students, namely: "CEP News!", "Let's Make!", and the motivation column.

- *Test sheets*

Evaluation sheets are designed based on indicators and learning objectives that must be mastered by students.

Fig 1:- Cover Modul

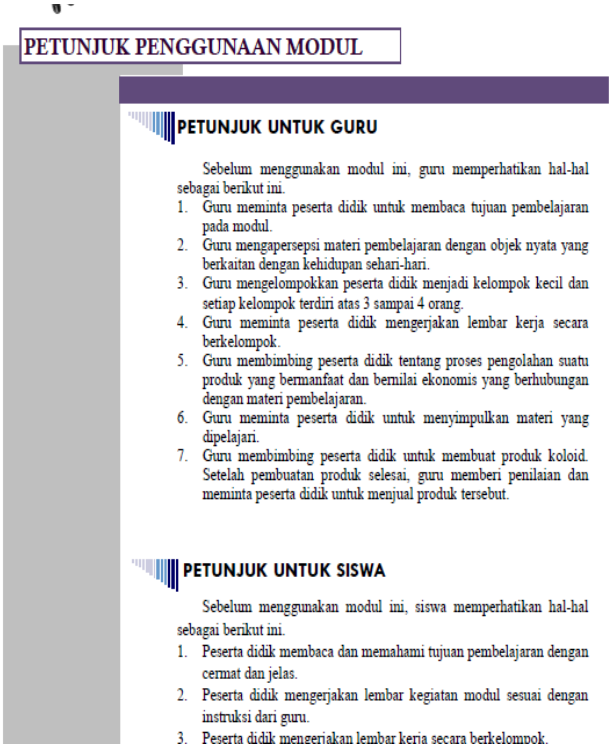

Fig 2:- Module usage instructions

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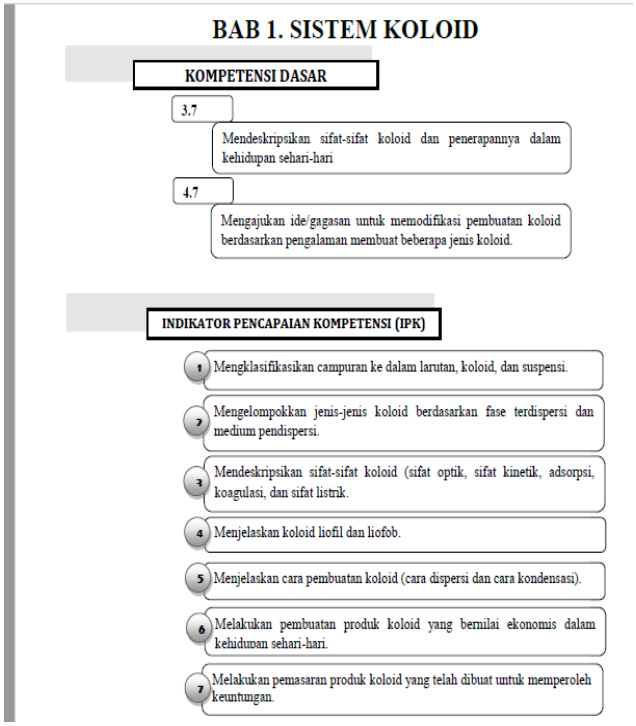

Fig 3:- Basic competencies

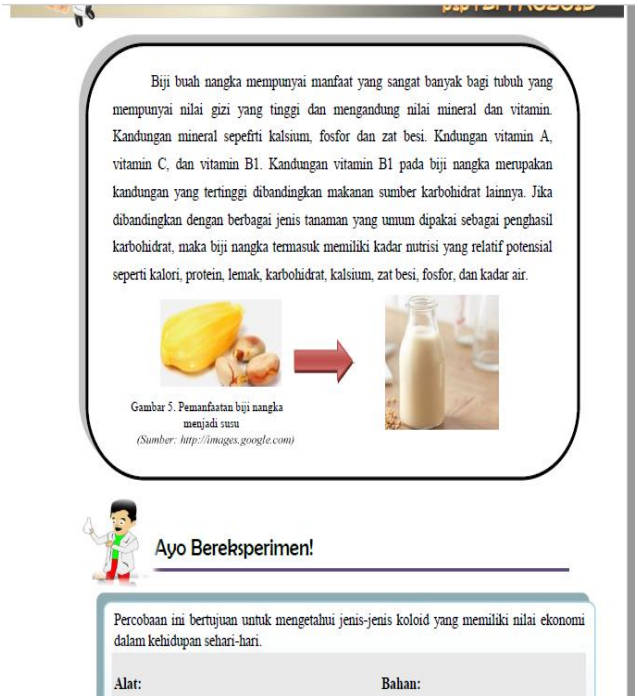

Fig 4:- Let's experiment

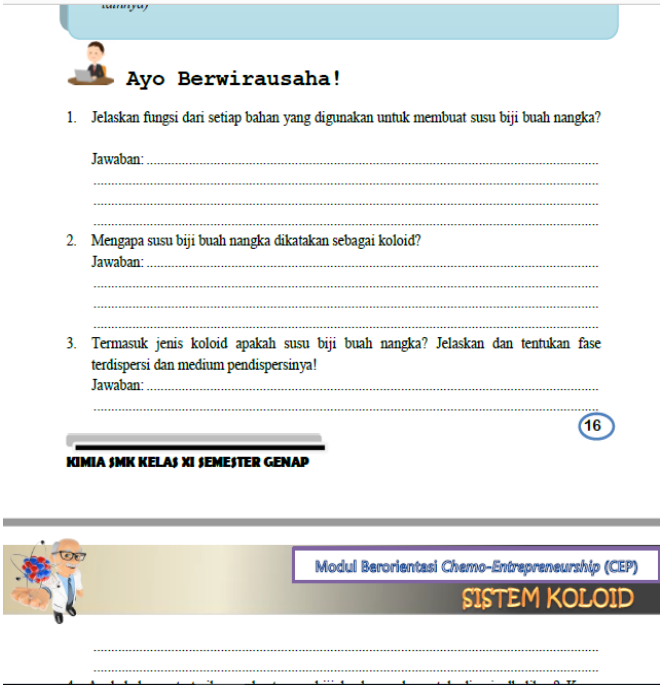

Fig 5:- Let's entrepreneurship

➢ *The Development Stage*

At this stage, a chemoentrepreneurship- oriented module is produced in class XI SMK for even semester that is valid and practical for use in chemistry learning.

- *Module Validity Test*

At this stage the chemoentrepreneurship oriented module is validated by the validator. Validation of this module is carried out to reveal the validity of the content, presentation, linguistics, and graphics.

No	Rated aspect	Average kappa moment value (κ)	Validity Category
1	Content eligibility	0.79	High
2	Feasibility of presentation	0.81	Very high
3	Language component	0.77	High
4	Graphic component	0.84	Very high
Average kappa moment (κ)		0.80	High

Table 2:- Results of Analysis of Validity Levels of Validators

Based on Table 2, it can be concluded that the module developed has a high validity category with an average kappa moment value per-aspect level of validity of 0.80. These values indicate that the module developed is valid.

- *Module Practicality Test*

The practicality of chemoentrepreneurship-oriented chemistry modules developed is seen from the use of the product in the limited trial results in the field. Module practicality data is obtained by giving practicality sheets to teachers and students with an assessment consisting of aspects of ease of use, time efficiency, and module benefits.

No	Theory	Kappa Moment (k)	Practicality Category
1	Colloid System	0.85	Very high
2	Hydrocarbon Compounds	0.92	Very high
3	Polymer Compounds	0.79	High
Average kappa moment (k)		0.85	Very high

Table 3:- Average Practicality Scores of Modules by Teachers

No	Theory	Kappa Moment (k)	Practicality Category
1	Colloid System	0.83	Very high
2	Hydrocarbon Compounds	0.88	Very high
3	Polymer Compounds	0.89	Very high
Average kappa moment (k)		0.87	Very high

Table 4

The average kappa moment of module practicality by the teacher is 0.85 with a very high practicality category. While the average kappa moment of module practicality by students is 0.87 with a very high practicality category. The percentage of learners increased interest in entrepreneurship after learning conducted using oriented module chemoentrepreneurship by 15.7%.

IV. DISCUSSION

➢ *The validity of chemoentrepreneurship- oriented modules*

Validity test is an assessment of the design of a product. The assessment aspect is divided into several components consisting of content eligibility , linguistic component, presentation component, and graphic component[9]. The validity of the contents of the chemistry module oriented chemoentrepreneurship for class XI Health Vocational High School has a kappa moment (k) of 0.79 with a high validity category. This shows that the module developed has included the components of content suitability, as stated by the Depdiknas 2008 that the suitability of the contents of a product developed includes the following : a) conformity with KI, and KD, b) conformity with the development of students , c) Conformity with the needs of teaching materials , d) The truth of the substance of learning material , e) Benefits for adding insight , f) Conformity with moral values, and social values[9].

The kappa moment (k) in the presentation component is 0.81 with the validity category for presentation eligibility is very high. The module that was designed has included the components of construct feasibility (feasibility of presentation) as stated by the Depdiknas 2008 that the construct feasibility of a product developed includes the following components: a) Clarity of objectives (indicators) to be achieved , b) Order of presentation , c) Providing motivation, attractiveness , d) Interaction (giving stimulus and response) , e) Completeness of information[9] .

The linguistic component has a kappa moment (k) of 0.77 with a high linguistic category. This shows that the chemoentrepreneurship- oriented chemistry module uses language that is already communicative and unambiguous (double meaning). The questions asked are clear by students, the language used is simple and is in accordance with Indonesian language rules.

The graphic component has a kappa moment (k) of 0.84 with a very high validity category. The validity level of the graphics component is very high because the images in the modules presented can be observed clearly, the type of letters used is precise and clear, the layout is regular, and the colors used can attract the attention of students. After revising the module in accordance with the suggestions of the validator, then a practicality test is performed.

➢ *Practicality of chemoentrepreneurship-oriented Modules*

Practicality assessment obtained by the teacher kappa moment of 0.85 with a very high practicality category. This practical category shows that the module developed is very practical to be used for Chemistry class XI in SMK Kesehatan. The very high practicality category indicates that the instructions for using the module can be understood. Modules are in accordance with the basic competencies and learning objectives that students want to achieve. In the introduction that is contextual or close to daily life has been able to motivate students to learn the material. The exercises presented in the module can further strengthen students in understanding concepts because the exercises presented are direct applications of the concepts.

Practicality assessment by students obtained kappa moment (k) of 0.87 with a very high practicality category. This practical category shows that using *chemo*-entrepreneurship - oriented modules can make it easier for students to understand lessons, easily understand the interrelationship between subject matter and students more easily remember the material being taught, and motivate students to become entrepreneurs.

Before learning and practicum conducted with the chemoentrepreneurship module , the percentage of entrepreneurial interest of students was 68.9%. This data was obtained based on a questionnaire about student's

entrepreneurial interests. After the implementation of learning using chemical module oriented chemoentrepreneurship given back questionnaire entrepreneurial interest to see how far the interest of students in entrepreneurship. The percentage of student's entrepreneurial interest increased to 84.6%. This means that the use of modules can increase student entrepreneurial interest.

V. CONCLUSION

Based on the results of research and analysis of data that has been carried out can be summarized as follows.

- Chemoentrepreneurship module can be developed in even semester XI class chemistry material at the Health Vocational High School through development research (R&D) using the 4-D development model.
- Chemoentrepreneurship module develop have high validity category, a very high practicality category by teachers and students, while able to increase the interest of the entrepreneurial class XI Health Vocational High School.

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